A New Monotypic Genus, *Ananthura*, from Tropical Africa (Asteraceae, Vernonieae)

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Abstract. A new genus, *Ananthura* H. Rob. & Skvarla (Asteraceae, Vernonieae), is described for *Vernonia pteropoda* Oliv. & Hiern in Oliv. of Central Africa. The genus has broad median shields on the involucral bracts and lophate, strongly tricolporate pollen. It is placed in the subtribe Gymnantheminae. The name *V. urophylla* Muschl. is lectotypified.

Key words: Africa, *Ananthura*, Asteraceae, Gymnantheminae, IUCN Red List, Vernonieae.

The realization that the genus *Vernonia* Schreb. (Asteraceae) is restricted to the Western Hemisphere, mostly in North America, has led to the need for alternative dispositions of all Asian and African species (Robinson, 1999a) and most of the tropical American species (Robinson, 1999b) that were placed in that genus. The process of providing those alternative dispositions continues here with the placement of the species *V. pteropoda* Oliv. & Hiern in Oliv. in a new monotypic genus, *Ananthura* H. Rob. & Skvarla, which has a distinctive appearance (Fig. 1) and shows a unique combination of involucral and palynological characteristics. The broad median shields on the involucral bracts place the genus in the subtribe Gymnantheminae, where it is distinguished by the strongly lophate tricolporate pollen (Fig. 2).

Methods

Specimens examined were from the U.S. National Herbarium in Washington, D.C. Microscopic structures were examined mostly using material mounted in Hoyer's solution (Anderson, 1954). Preparation of pollen for scanning electron microscopy (SEM) consisted of acetolysis (Erdtman, 1960) followed by the osmium-thiocarbohydrazide procedure (Chissoe et al., 1995) and pulse sputter-coating with a gold:palladium (60:40) target (Chissoe & Skvarla, 1996). Examination was performed at the University of Oklahoma with a JEOL 880 SEM (JEOL Ltd., Tokyo, Japan) equipped with a lanthanum hexaboride (LaB_6) electron source operating at 15 KV.

Results and Discussion

Jeffrey (1988: 213–215) placed *Vernonia pteropoda* in his Group 2 subgroup B, a group he described as "...a large, ill-defined subgroup of Afroasian species, characteristically rather weak often decumbent or ± scandent shrubs but sometimes attaining tree stature." Jeffrey placed the species in the first aggregate within his subgroup, an aggregate stated to have "persistent inner phyllaries and ± 10-ribbed achenes." Jeffrey cited Kingham (1976) in saying all members of his subgroup B had subechinolophate to echinate, tricolporate, micropunctate pollen grains. The aggregate of Jeffrey included a mixture of species, some now placed in the Vernonian subtribe Erlangeinae and some in the subtribe Gymnantheminae (Keeley & Robinson, 2009). Among the species in the group defined by Jeffrey (1988), *V. pteropoda* seems to stand alone without any immediate relatives.

Vernonia pteropoda is a singularly distinctive species with a herbaceous to weakly suffrutescent habit, leaf blades with sharply and closely serrate margins, slenderly acuminate leaf tips, and a long petiole that has a tapered narrow wing reaching almost to the base. Identification of the species on which the genus is based is not a problem. Relationship to the Gymnantheminae also seems confirmed by the involucral bracts having broad median shields with no discrete median costa or keel. Such involucral bracts place the genus in the subtribe Gymnantheminae in both the broad sense of that subtribe in Robinson (1999a, 2007) and the narrower sense of Keeley and Robinson (2009).

Placement of *Vernonia pteropoda* in the genus *Gymnanthemum* Cass., a genus of mostly shrubby plants, might be possible except for the herbaceous habit and pollen morphology of *V. pteropoda*.

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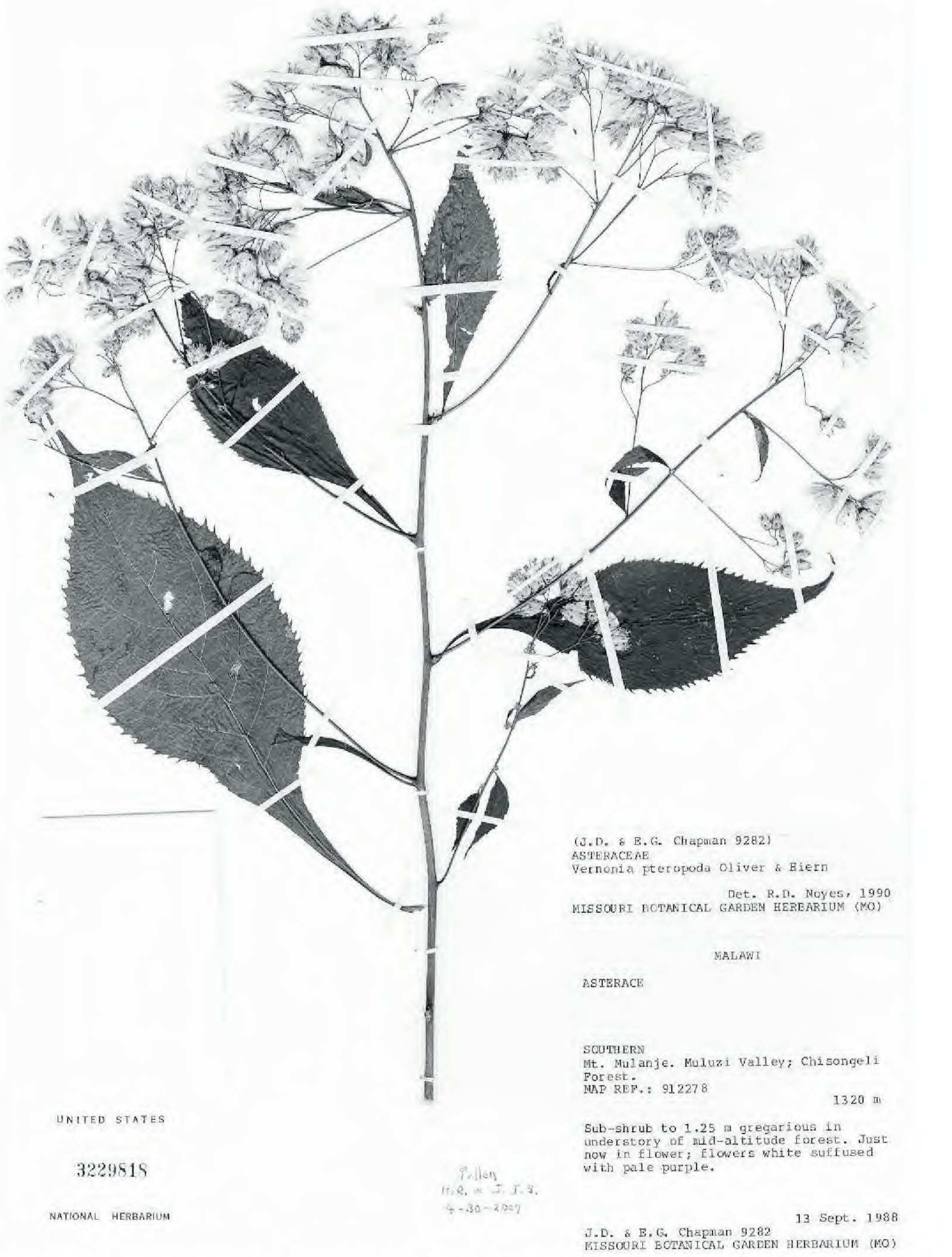

Figure 1. *Ananthura pteropoda* (Oliv. & Hiern in Oliv.) H. Rob. & Skvarla (*J. D. & E. G. Chapman 9282*, US) showing habit of plant.

Gymnanthemum also tends to have distinctly deciduous inner involucral bracts, while the bracts of the new genus seem comparatively persistent. The strongly lophate pollen is particularly notable in distinguishing these taxa.

In the overly broad concept of *Gymnanthemum* in the first attempt to delimit the genus (Robinson, 1999a), plants with both sublophate (Skvarla et al., 2005) (Type A of Jones [1979, 1981] and Keeley & Jones [1977, 1979]) and lophate (Blackmore et al.,

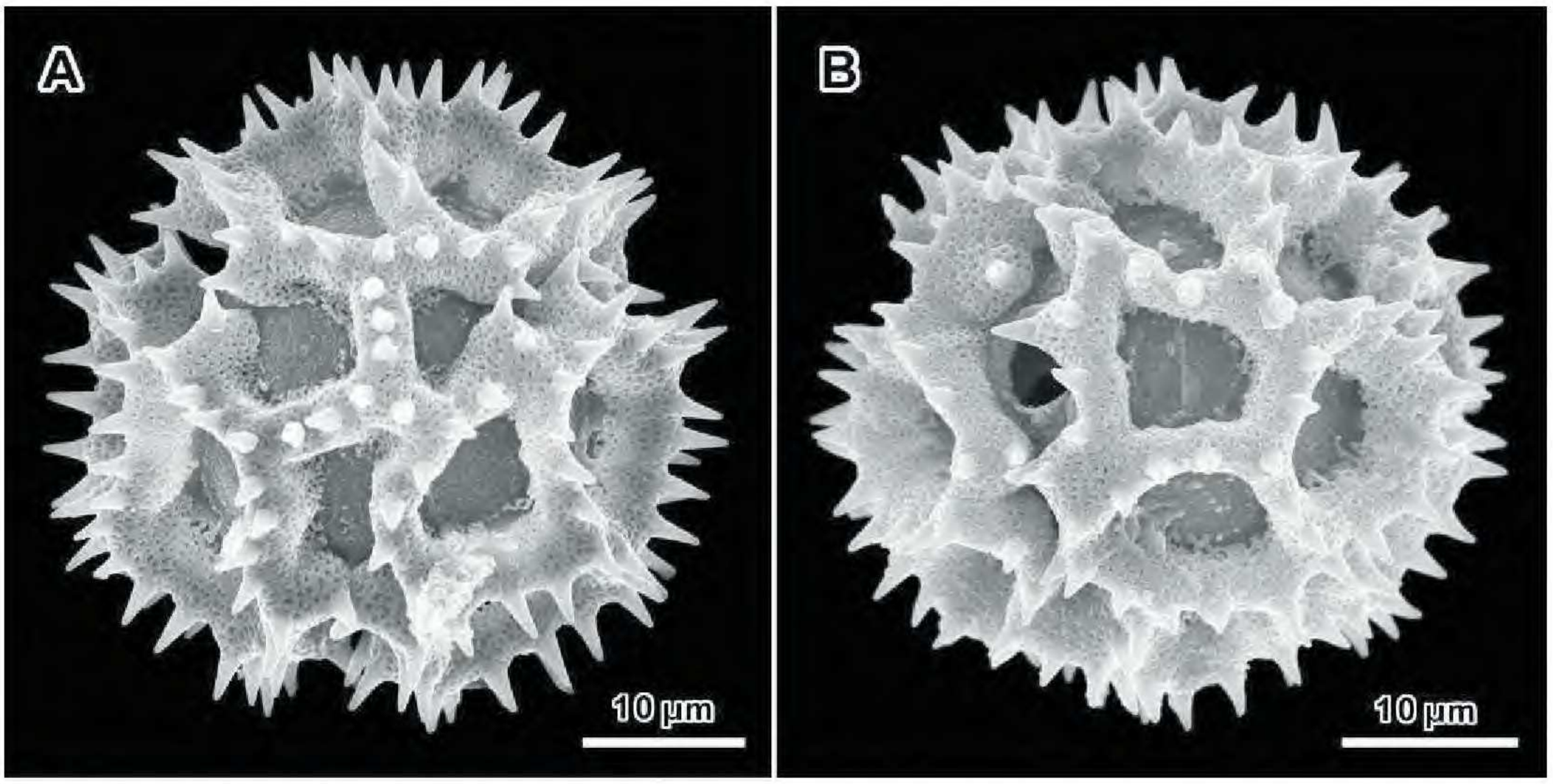

Figure 2. Scanning electron micrographs of pollen of *Ananthura pteropoda* (Oliv. & Hiern in Oliv.) H. Rob. & Skvarla (*J. D. & E. G. Chapman 9282*, US). —A. Polar view of pollen grain showing three colpi meeting at pole. —B. Lateral view of grain showing pore and intercolpus.

2009) types of pollen were included. All of the forms of pollen in the genus were tricolporate; there were none of the triporate types that occur in the subtribe Erlangeinae (Keeley & Robinson, 2009). Although tricolporate sublophate pollen is found in almost all groups of the Vernonieae, the Erlangeinae have no lophate types that are strongly tricolporate. It was in a more recent study that the lophate forms of pollen initially credited to *Gymnanthemum* were found to characterize a thoroughly distinct genus, *Monosis* DC. in Wight (Robinson & Skvarla, 2006). At this time, *Gymnanthemum* is known to have exclusively sublophate pollen with a continuous perforated tectum in the noncolpar areas, although that pollen has well-developed incipient lacunae. The pollen of the new genus, *Ananthura* (Fig. 1), is of a tricolporate lophate form, with sharply delimited muri bearing regularly aligned spinules. The new genus has pollen more like *Linzia* Sch. Bip. ex Walp. of the subtribe Linziinae, having short spur muri intruding into the colpi above and below the pores. The subtribes Linziinae and Gymnantheminae are considered closely related (Keeley & Robinson, 2009), but placement of *Vernonia pteropoda* in *Linzia* is negated by the presence of the shields on the involucral bracts in *Ananthura* and by the lack of the series of pectinate denticulations on the lateral margins of the involucral bracts that are characteristic of *Linzia*. Unlike many members of the Erlangeinae, all of the pollen types in the Gymnantheminae and Linziinae, including the new genus, have a perforated tectum, at least on the muri.

Confirmation of the general placement of the genus from either DNA sequences (Keeley et al., 2007) or from secondary metabolite chemistry (probable presence of elemanolide rather than glaucolide sequiterpene lactones or 5-methylcoumarins [Bohlmann & Jakupovic, 1990]) is presently lacking, but the species is singularly distinctive and the genus cannot be mistaken for any of the related genera.

The leaves of *Ananthura* alone will distinguish the taxon. The leaf blade is membranaceous to thinly herbaceous and ovate to elliptic, with irregularly closely and sharply serrate margins; the leaf tip is abruptly and narrowly long-acuminate. The most distinctive feature is the long, winged petiole of the leaf. Also distinctive in the species is the regular fringe of short, small, crowded teeth that form the outer series of the pappus that persists after the fragile inner pappus has been lost. In appearance, that persistent outer pappus is reminiscent of the teeth on the mouth of a polytrichaceous moss capsule.

The new genus is named after a final rather distinctive characteristic, the completely blunt, unappendaged, ecaudate, but calcarate bases of the anther thecae. In this character the genus differs from *Gymnanthemum* and *Brenandendron* H. Rob. of the Gymnantheminae, which have basal appendages, and is more like *Linzia*, which lacks them.

Ananthura H. Rob. & Skvarla, gen. nov. TYPE: *Vernonia pteropoda* Oliv. & Hiern in Oliv.

Genus novum *Gymnanthemo* Cass. simile, sed ab eo habitu herbaceo, bracteis involucri aliquanto persistentibus et granis pollinis lophatis tricolporatis distinctum.

Herbs to weak subshrubs on forest floors, to 1.4 m tall, with few or no lateral branches; stems terete, striated, with narrow solid pith, surface sparsely puberulous with multicellular uniseriate hairs. Leaves alternate, petioles to 8 cm, with tapering wings reaching nearly to the base; blade membranaceous to thinly herbaceous, ovate to elliptic, to 15 cm, base attenuate into wings of petiole, margins irregularly sharply and closely single or double serrate, teeth with slender callose tips, apex strongly long-acuminate into slender tip to 2 cm; adaxial surface of lamina and wings sparsely pilosulose, denser on midvein and secondary veins, abaxial surface puberulous, spreading pilosulose on veins, with numerous yellowish glandular dots on surface; venation pinnate, with 6 or 7 arching secondary veins. Inflorescence terminal, and from axils of upper leaves, with decrescent foliiform bracts on main axis, branches slender, widely spreading below, distal branches more ascending, with few ribs, puberulous with numerous yellow glandular dots, distal branches more slender and shorter, peduncles mostly 5–10 mm. Heads cylindrical at anthesis, 5–6 mm wide; involucres mostly ca. 8 mm high; bracts in 4 to 5 gradate series, appressed, persistent until late in fruiting, imbricate, ca. 1–7 mm, broadly ovate to oblong with blunt or rounded narrowly scarious tips, essentially glabrous, except for small hairs and glandular dots in subapical often green patch, large median area of outer surface essentially smooth and usually pale greenish or brownish with age, usually with 3 longitudinal rather dark lines, margins entire, lateral margins broadly scarious; receptacle flat, alveolate, glabrous. Florets ca. 15 in a head; corollas white, narrowly funnelform, ca. 9 mm, mostly glabrous, basal tube filiform, ca. 4 mm, upper broadened part above filament insertions ca. 2 mm, lobes narrow, ca. 3 mm, slightly scabridulous with minute antrorse hairs near tip; anther thecae ca. 2 mm, calcarate bases ecaudate, without tail or fringe, apical appendage oblong-ovate; style with narrow sclerified annulus at base, apical style branches slender with sweeping hairs on whole outer surface and on upper ca. 0.5 mm of style shaft. Achenes 2.2–2.5 mm, prismatic, ca. 8-ribbed, ribs persistently yellow as they mature, surface hispidulous with minute hairs, walls internally with numerous minute subquadrate to rounded raphids; inner pappus bristles capillary, ca. 5 mm, slender, fragile, minutely barbellate, outer pappus a row of close-set minute, persistent teeth ca. 0.2 mm.

Pollen grains (Fig. 2) are spherical, 35–37 μm diam. when dry, tricolporate, lophate, colpi meeting at the poles, lacunae in each intercolpus in 1:2:2:1 pattern; muri well-defined, with regular rows of 3 or 4 spinules along each crest, subtended by bacculae under muri, not rhizomate, firmly attached to footlayer; perforated tectum present on muri but lacking on floors of lacunae.

Ananthura pteropoda (Oliv. & Hiern in Oliv.) H. Rob. & Skvarla, comb. nov. Basionym: *Vernonia pteropoda* Oliv. & Hiern in Oliv., Fl. Trop. Afr. 3: 283. 1877. TYPE: Malawi. Mt. Chiradzura, 1860–1863, *C. J. Meller s.n.* (holotype, K).

Vernonia urophylla Muschl. in Engl., Bot. Jahrb. Syst. 46: 86. 1911. TYPE: Tanzania. Derema, 1899, *G. Scheffler 77* (lectotype, designated here, BM).

Distribution and habitat. *Ananthura pteropoda* is known from Kenya, Tanzania, Congo, Mozambique, Malawi, Zambia, and Zimbabwe (Jeffrey, 1988). The taxon has been observed as gregarious in the understory of midaltitude forests.

IUCN Red List category. *Ananthura pteropoda* is known from many localities, but all are in possibly endangered forested areas. The conservation status according to IUCN Red List criteria (IUCN, 2001) is Not Evaluated (NE).

Etymology. The species name for *Ananthura pteropoda* derived from the long, winged petiole of the leaf. The name of the synonym, *Vernonia urophylla*, is derived from the long slender tip of the leaf.

Note. The syntype at BM is selected as the lectotype for *Vernonia urophylla*. Two other syntypes (*Engler 832*, *Warnecke 425*) were both destroyed at B.

Specimens seen. MALAWI. Nyassaland, 1891, *Buchanan 11.49* (K, US); Cholo Distr., Cholo Mtn., 1300 m, 20 Sep. 1946, *Brass 17679* (NY, US); Zomba Plateau, Chiradzulu Peak, near fire tower, 13 Oct. 1983, *Balaka & Gowa 293* (US); southern Malawi, Mt. Mulanje, Muluzi Valley, Chisongeli Forest, 1320 m, 13 Sep. 1988, *J. D. & E. G. Chapman 9282* (MO, US). TANZANIA. "Uluguru Urwald sudöste von Mission Schlesein über Norogoro," 1600 m, 1 Nov. 1914, *Peter O II 104* (US).

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